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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/967,173	09/28/2001	Konstantin Vodopyanov	6033-007	5986

7590

08/21/2003

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EXAMINER

MENEFEE, JAMES A

ART UNIT

PAPER NUMBER

2828

DATE MAILED: 08/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/967,173

Applicant(s)

VODOPYANOV, KONSTANTIN

Examiner

James A. Menefee

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-38 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 September 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_.
- 6) ☐ Other: \_\_\_\_.

## **DETAILED ACTION**

### ***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the features of claims 19-38 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 19-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 19 uses the term “3ω” in line 6. This appears to be an error, and should read “4ω”.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 7-12, 16-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Komine (US 5,400,173). See especially Figs. 1, 3, and 8.

Regarding claims 1 and 10, Komine discloses a frequency converter comprising an optical cavity that is defined by a cavity axis and first and second mirrors 14, 43 spaced along the axis; a light source 11 that provides a pump laser beam wave 0 having photons with associated frequency  $3\omega$  within the cavity; a first nonlinear crystal 15 and a second nonlinear crystal 42 positioned along the cavity, and configured so that at least one pump photon passes through and interacts with the first crystal 15 and undergoes a conversion to a first-converted photon wave 1 having a frequency  $2\omega$  and a first second-converted photon wave 2 having frequency  $\omega$ ; the first-converted photon wave 1 passes through and interacts with the second crystal 42 and undergoes a conversion to second and third second-converted photons waves 3 and 4 having frequencies substantially equal to  $\omega$ , such that the pump photon wave 0 is converted to three photons each having a frequency substantially equal to  $\omega$ .

Regarding claims 2 and 11, at least one of said second-converted photons exits from the cavity through the second mirror 43.

Regarding claims 3 and 12, the first mirror 14 is transmissive to waves 0 and 2 and reflective to wave 1, thus is transmitting at  $\omega$  and  $3\omega$  and reflective at  $2\omega$ .

Regarding claims 7 and 16, these equations are not explicitly disclosed by Komine. However, the system of Komine performs the exact same function using the exact same elements. It has been held that when the structure of the prior art is identical to the structure of the claims, claimed properties are presumed to be inherent.

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Regarding claims 8-9 and 17-18, the light source 11 may be Nd:YAG, and at least one crystal may be AgGaSe<sub>2</sub>.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 19-22, 26-32, and 36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komine. Komine teaches the limitations of these claims as shown in the above rejection, except does not teach that the pump beam is  $4\omega$ , which is converted in the first crystal to photons at  $2\omega$ , which are then converted in the second crystal to photons at  $\omega$ . Optical parametric oscillators, such as 12 of Komine, are known that convert a beam of  $4\omega$  to a beam of  $2\omega$ . Thus, waves 1 and 2 of Komine would then each be  $2\omega$ . Such beams, when put through OPO2 (13), would be converted into four photons at  $\omega$ . It would have been obvious to one skilled in the art to substitute an OPO that converts  $4\omega$  to two photons of  $2\omega$  for the OPO 12 of Komine, by matter of obvious engineering design choice. The purpose of Komine is to produce output radiations at frequencies where there are no efficient laser devices, and thus if one skilled in the art, for some particular application, needed to produce a laser having a wavelength quadruple that of a typical laser (rather than just triple as disclosed in Komine), then that skilled artisan could easily extrapolate the teachings of Komine to see that such a wavelength could be produced by the substitution outlined here.

Claims 4-6 and 13-15, 23-25, and 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komine in view of Akagawa et al. (US 5,953,154).

Komine discloses the limitations of the claims shown above, but does not disclose that one of the crystals has an AR coating as claimed, or that the mirrors may be disposed on an end of the crystals. Akagawa teaches that in an optical parametric amplifier, such as the system of Komine, the mirrors surrounding the nonlinear crystal may be disposed on the ends of the crystal (see Fig. 7, mirrors 30,32 on crystal 14). Though the motivation is not explicitly stated by Akagawa, it would have been obvious to one skilled in the art to dispose the mirrors on the ends of the crystals, as this would decrease the size of the system and simplify any necessary alignment of the mirrors, as is well known. Since the mirrors are transmissive to the frequencies as required by the claims, then this is equivalent to there being an AR coating on the ends for these frequencies.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Menefee whose telephone number is (703) 605-4367. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Ip can be reached on (703) 308-3098. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JM

July 31, 2003

  
QUYEN LEUNG  
PRIMARY EXAMINER

for  
Sra Paul Ap